

CLAIMS

It is claimed:

- 1 1. A pair of semiconductor devices configured for a push-pull operation,
- 2 comprising:
- 3 a first device, comprising:
- 4 a first n-doped region;
- 5 a first p-doped region;
- 6 a p-doped channel situated between said first n-doped and first p-doped
- 7 regions, wherein a first depletion region exists within said channel when a reverse bias
- 8 voltage is applied across said first n-doped and first p-doped regions; and
- 9 a first photosensitive region comprising a relatively high p-doped region
- 10 situated within said p-doped channel and partially including said first depletion region
- 11 when said reverse bias voltage is applied across said first n-doped and first p-doped
- 12 regions, wherein hole-electron pairs are generated from said partial first depletion
- 13 region within said first photosensitive region in response to an incident light upon said
- 14 first photosensitive region;
- 15 a second device, comprising:
- 16 a second p-doped region;
- 17 a second n-doped region;
- 18 an n-doped channel situated between said second n-doped and second p-
- 19 doped regions, wherein a second depletion region exists within said n-doped channel
- 20 when a reverse bias voltage is applied across said second n-doped and second p-doped
- 21 regions; and

22 a second photosensitive region comprising a relatively high n-doped
 23 region situated within said n-doped channel and partially including said second
 24 depletion region when said reverse bias voltage is applied across said second n-doped
 25 and second p-doped regions, wherein hole-electron pairs are generated from said partial
 26 second depletion region within said second photosensitive region in response to said
 27 incident light upon said second photosensitive region;
 28 a first impedance load connected to said first n-doped region for
 29 receiving a first bias voltage;
 30 a second impedance load connected to said second p-doped region for
 31 receiving a third bias voltage; and
 32 wherein said first p-doped region and said second n-doped region are
 33 coupled together to a third bias voltage, and wherein said first bias voltage is more
 34 positive than said third bias voltage, and further wherein said third bias voltage is more
 35 positive than said second positive voltage.

1 2. The pair of semiconductor devices of claim 1, wherein said third bias
 2 voltage is at ground potential.

1 3. The pair of semiconductor devices of claim 1, further including a fiber
 2 optic channel for applying an optical signal to said first and second photosensitive
 3 regions.

1 4. A pair of semiconductor devices configured for a push-pull operation,
 2 comprising:
 3 a first device, comprising:

4 a first n-doped region;
 5 a first p-doped region;
 6 a p-doped channel situated between said first n-doped and first p-doped
 7 regions, wherein a first depletion region exists within said channel when a reverse bias
 8 voltage is applied across said first n-doped and first p-doped regions; and

9 a first photosensitive region comprising a relatively high p-doped region
 10 situated within said p-doped channel and partially including said first depletion region
 11 when said reverse bias voltage is applied across said first n-doped and first p-doped
 12 regions, wherein hole-electron pairs are generated from said partial first depletion
 13 region within said first photosensitive region in response to an incident light upon said
 14 first photosensitive region;

15 a second device, comprising:

16 a second p-doped region;

17 a second n-doped region;

18 an n-doped channel situated between said second n-doped and second p-
 19 doped regions, wherein a second depletion region exists within said n-doped channel
 20 when a reverse bias voltage is applied across said second n-doped and second p-doped
 21 regions; and

22 a second photosensitive region comprising a relatively high n-doped
 23 region situated within said n-doped channel and partially including said second
 24 depletion region when said reverse bias voltage is applied across said second n-doped
 25 and second p-doped regions, wherein hole-electron pairs are generated from said partial
 26 second depletion region within said second photosensitive region in response to said
 27 incident light upon said second photosensitive region;

28 a first impedance load connected to said first n-doped region at a first
 29 end thereof and to said second n-doped region at a second end thereof, wherein a first
 30 bias voltage is to be applied to said second end of said first impedance load; and
 31 a second impedance load connected to said first p-doped region at a first
 32 end thereof and to said second p-doped region at said second end thereof, wherein a
 33 second bias voltage is to be applied to said second end of said second impedance load,
 34 wherein said first bias voltage is more positive than said second bias voltage.

1 5. The pair of semiconductor devices of claim 4, wherein said second bias
 2 voltage is at ground potential.

1 6. The pair of semiconductor devices of claim 4, further including a fiber
 2 optic channel for applying an optical signal to said first and second photosensitive
 3 regions.

1 7. A semiconductor device configured for a push-pull operation,
 2 comprising:
 3 a p-doped region;
 4 an n-doped region;
 5 an n-doped channel situated between said second n-doped and second p-
 6 doped regions, wherein a second depletion region exists within said n-doped channel
 7 when a reverse bias voltage is applied across said second n-doped and second p-doped
 8 regions; and
 9 a second photosensitive region comprising a relatively high n-doped
 10 region situated within said n-doped channel and partially including said second

11 depletion region when said reverse bias voltage is applied across said second n-doped
 12 and second p-doped regions, wherein hole-electron pairs are generated from said partial
 13 second depletion region within said second photosensitive region in response to said
 14 incident light upon said second photosensitive region;
 15 a first load impedance having a first end coupled to said n-doped region,
 16 and a second end for receiving a first bias voltage;
 17 a second load impedance having a first end coupled to said p-doped
 18 region, and a second end for receiving a second bias voltage, wherein said first bias
 19 voltage is more positive than said second bias voltage.

1 8. The semiconductor device of claim 7, wherein said second bias voltage
 2 is at ground potential.

1 9. The semiconductor device of claim 7, further including a fiber optic
 2 channel for applying an optical signal to said first photosensitive region.

1 10. A semiconductor device configured for a push-pull operation,
 2 comprising:
 3 an n-doped region;
 4 a p-doped region;
 5 a p-doped channel situated between said first n-doped and first p-doped
 6 regions, wherein a first depletion region exists within said channel when a reverse bias
 7 voltage is applied across said first n-doped and first p-doped regions; and
 8 a first photosensitive region comprising a relatively high p-doped region
 9 situated within said p-doped channel and partially including said first depletion region

10 when said reverse bias voltage is applied across said first n-doped and first p-doped
11 regions, wherein hole-electron pairs are generated from said partial first depletion
12 region within said first photosensitive region in response to an incident light upon said
13 first photosensitive region;
14 a first load impedance having a first end coupled to said n-doped region,
15 and a second end for receiving a first bias voltage;
16 a second load impedance having a first end coupled to said p-doped
17 region, and a second end for receiving a second bias voltage, wherein said first bias
18 voltage is more positive than said second bias voltage.

1 11. The semiconductor device of claim 10, wherein said second bias voltage
2 is at ground potential.

1 12. The semiconductor device of claim 10, further including a fiber optic
2 channel for applying an optical signal to said first photosensitive region.